SPACEFLIGHT TRACKING AND DATA NETWORK

ENGINEERING CHANGE

Title: WDISC Expansion

EC: 8312

System: DIS

Req. Source: Code 530

Time Estimate: 740 man-hours

Cost Estimate: 15K

Cognizant Engineer/Phone: Bryan Gioannini / 527-7002

Approval:

Contractor Cognizant Engineer: James Edgington / 527-7028

Chairman,
Configuration Control Board

Attachments:
Figure 5-1 Block Diagram of WDISC IONET Links
Figure 5-2 Block Diagram of WDISC Receive Cabling
Figure 5-3 Block Diagram of WDISC Transmit Cabling
Figure 5-4 Rack 7109 Elevation
Figure 5-5 Rack 7109 Patch Panels
Figure 5-6 FWD Switch I/O
Figure 5-7 RCV Bridge I/O
Figure 5-8 RCV Bridge Input Cable
Figure 5-9 RCV Bridge Output Cable
Figure 5-10 FWD Switch In/Out Cable
Figure 5-11 PTP Monarch Bd. Cable
Figure 5-12 5Mhz Expander I/O
Figure 5-13 Austron 5MHz Cable
Table 5-1 WDISC COM Port Cabling
Cable Upgrade Control Sheet
Hardware Upgrade Control Sheet
Documentation Upgrade Control Sheet
Test Data Record
Design Review Record
System Safety Checklist

1.0 STATIONS AFFECTED:

WSGT, STGT

2.0 APPLICATIONS:

2.1 Statement of Requirements

The WSC Transmission Control Protocol (TCP) / Internet Protocol (IP) Data Interface Service Capability (WDISC) provides TDRS support for Users that require unblocked TCP/IP forward and return data instead of the legacy NASCOM 4800-bit block. GSFC has requested WSC support in expanding the WDISC to provide a doubling of the current channel capability and an increase in potential throughput. WSC Engineering has been tasked with installing additional WDISC equipment in rack 7109 at both STGT and WSGT. This EC describes the WSC WDISC Expansion installation.

2.2 Theory of Modification

The WDISC Expansion racks will contain prime and redundant Programmable Telemetry Processors (PTP) to act as interfaces between the WSC IONET routers and the DIS Low Rate Data Switches (LRDS). An expansion PTP will have three separate Local Interface (LI) User connections to the LRDS via individual Avtec Monarch plug-in boards. Each user connection will consist of one LI

Forward port and one LI Return port. DR45337 has been generated to initiate the software changes required to enable these LI functions. In addition to the two PTPs, return data splitters and forward data switching capabilities are provided within the WDISC rack to allow PTP failover. Control of the FWD switches will be via RS-232 ports from each PTP to dual control ports on the switch equipment. WDISC Users will schedule the TDRS Ground Control Equipment (GCE) and the WDISC through the NCC-DS system. The Users will be responsible for making IONET TCP/IP connections to a PTP for FWD and RTN data.

The 7109 racks will be re-labeled as ISS/WDISC due to the presence of the ISS FWD SKDs. Forward and Return Service Patch Panels will be connected to the GCE via the Low Rate Data Switch (LRDS). They provide a line of demarcation between the LI and the GCE. The three WDISC FWDs will be designated LI "H", "Q" and "R" in SHO Subheader No. 5, DIS Receive Parameters. They will use LRDS inputs 88, 178, and 179 respectively. The three WDISC RTNs will be designated LI "L", "M", and "N" in SHO Subheader No. 6, DIS Transmit Parameters. They will use LRDS outputs 199, 236, and 237 respectively. A quad 1-to-2 bridge will provide the Return signal fanout for the two PTPs. A Dataprobe RS-422 A/B Switch with dual RS-232 control ports will constitute one forward switch assembly. Each of the three LI ports will have a forward switch assembly to control which PTP is providing that set of Forward signals. The WDISC PTPs will be connected to the closed IONET via a 10baseT hub connected to the existing LIPPS LAN routers in rack 7108.

2.3 Equipment Affected

Qty. / site	Equipment	Status	Location
1 each	Kbd&Monitor&Mouse	Install	WSGT, STGT
2 each	5 MHz Expander	Install	WSGT, STGT
1 each	5 MHz Exp. Pw. Supply	Install	WSGT, STGT
1 each	KVM Switch	Install	WSGT, STGT
2 each	PTP Fileserver	Install	WSGT, STGT
3 ech	FWD Switch Module	Install	WSGT, STGT
1 each	RS-422 Bridge Module	Install	WSGT, STGT
2 each	Patch Panels	Install	WSGT, STGT

3.0 EQUIPMENT MODIFICATION INSTRUCTIONS:

None

4.0 SYSTEM INTEGRATION INSTRUCTIONS:

The IONET connections must be in place before system testing can commence. NISN must configure the routers to provide the WDISC IONET access.

5.0 INSTALLATION / RELOCATION INSTRUCTIONS:

5.1 Relocate the SPTR TDI I/O panel from rear of rack 7109 to rear of rack 7108 (both sites). Re-label the affected cables.

5.2 Refer to Figure 5.1-1 for the WDISC IONET block diagram. Refer to Figure 5.1-2 for a detailed block diagram of the WDISC Receive cabling. Refer to Figure 5.1-3 for a detailed block diagram of the WDISC Forward cabling. Refer to Figure 5.1-4 for the rack 7109 equipment elevation. Refer to Figure 5.1-5 for the WDISC Patch Panel layout.

5.3 Modify rack 7109 for dual 20 amp power strips. Modify the 7109 power feeds for 20 amp service. Install the GSFC provided WDISC Expansion system at rack 7109.

5.4 Install the GSFC provided WDISC Expansion system at rack 7109. Fabricate and install the twinax cables between the LRDS patch panels and the WDISC patch panels. Install new labels on the 7109 end of the existing CTFS-A IRIG-B cable. Fabricate and install the CTFS-B internal rack cabling for

the second WDISC IRIG-B cable. Label the new I/O jack for rack 1059. Fabricate and install the IRIG-B cabling between 1059 and 7109. Install all cabling per the Cable Upgrade Control Sheet.

5.5 Wherever practical, chassis slides and cable retractors will be used with this equipment to allow extending the chassis for both testing and maintenance purposes.

6.0 DISPOSITION INSTRUCTIONS:

N/A

7.0 TESTING:

7.1 Pre-Tear Down Testing

None

7.2 Installation /Relocation Testing

Perform continuity and short tests on all newly fabricated cables. Perform BER tests on the LRDS cabling by looping the Receive side back to the Transmit side at the WDISC Patch Panels.

7.3 Equipment Testing

Ensure that the PTP fileservers boot up correctly with no obvious error messages or malfunctions.

7.4 System Testing

The system interfaces will be tested by the appropriate engineering group. The closed IONET connection will be tested by NISN. The USS to WDISC connection will be tested by the WDISC project group via SHOs that contain the proper Subheader 5 and 6 information for the WDISC LI.

7.5 Operational Acceptance Testing

The successful completion of the above mentioned tests will constitute the engineering and pre-operational acceptance testing. Additional Operational testing may be performed by the WDISC project group using the established TDRS scheduling services.

8.0 OPERATIONAL / MAINTENANCE INSTRUCTIONS:

Maintenance and Operation of these devices will be performed by WSC personnel per the appropriate equipment manuals. The WDISC project office will provide initial Desktop Management for new WDISC Expansion Users.

9.0 DOCUMENTATION:

9.1 Essential

9.1.1 MANUALS:

PTP documentation

9.1.2 DRAWINGS:

N/A

9.2 Affected: See DUCS.

10.0 PARTS REQUIRED / SUPPLIED:

10.1 Logistics Supplied

ITEM	QTY	NSN / Mfg. Part No.	Description	MFG	Price	Total

1.	3 ea.	V24GB606	20 Amp power strip, 6' long	Wiremold	42.00	126.00
2.	3 ea.	V2410A	Fitting, entrance end	Wiremold	4.12	12.36
3.	2 ea.	THHQB1120	Breaker, 1 pole, @@KAIC, 20A	GE	16.50	16.50
4.	3 ea.	IGL520-R	Receptacle, Isol Gnd, 20 A,TwLock	Pass & Seymour	15.00	45.00
5.	1 ea.	QOB120VH	Breaker, 20A, 1 pole, 22KA1C	Square D	33.00	33.00
6.	3 ea.	L520-P	Plug, locking, NEMA L5-20P	Bryant	8.00	24.00
7.	50 ea.	PL75C-215	TRB connector for AA-7028	Trompeter	15.00	750.00
8.	3000 ft.	AA7028	Plenum twinax cable	Times	2.50	7500.00
9.	250 ft.	RG-400	Plenum coax cable	Best Source	1.00	250.00
10.	4 ea.	M39012/26B0006	TNC male connector	Best Source	15.00	60.00
11.	2 ea.	2-330358-2	BNC male connector	AMP	15.00	30.00
12.	2 ea.	225557-6	TNC female bulkhead connector	AMP	20.00	40.00
13.	4 ea.	PL75C-222	TRB connector for CXN-2363	Trompeter	20.00	80.00
14.	4 ea.	M24308/4-2	Male 9-pin Sub-D connector w/pins	Best Source	6.00	24.00
15.	4 ea.	745854-1	Backshell for DE-9 connector	AMP	3.00	12.00
16.	60 ft.	CXN-2363	Plenum twinax cable	Gore	7.00	420.00
17.	8 ea.	5935-00-N95-7728	RJ-45 modular plug for CAT5 cable	Best Source	1.00	8.00
18.	100 ft.	6145-00-N95-0107	CAT5 Plenum UTP cable	Best Source	.50	50.00
						0
					TOTAL	9480.86

10.2 Engineering Supplied

ITEM	QTY	NSN / Mfg. Part No.	Description	MFG	Price	Total
1.	4ea.	PTPNT-1007	Rackmount PTP system	Avtec		GFE
2.	2 ea.	CS-138A	KVM Switch	Aten		GFE
3.	2 ea.		Kbd/Vid/Mse tray, rack mount	Dell		GFE
3.	4 ea.		TRB Patch Panel	Trompeter		GFE
4.	2 ea.	GEN 0230 301	Receiver / Driver Chassis			GFE
5.	6 ea.	4PK-AB-T1-R1	A/B Switch (Q020816G)	Dataprobe		GFE
6.	4 ea.	DB-422-8	RS-422 Expander (for 5 MHz)	Dataprobe, Inc.		GFE
7.	2 ea.	DB-RPS110A-R1	5 V Power Supply	Dataprobe, Inc.		GFE

10.3 Spare Parts Provisioning

ITEM	QTY	NSN / Mfg. Part No.	Description	MFG	Price	Total
1.	1 ea.	PTPNT-1007	Rackmount PTP system	Avtec		GFE
2.	1 ea.	GEN 0230 301	Receiver / Driver Chassis			GFE
3.	1 ea.	4PK-AB-T1-R1	A/B Switch (Q020816G)	Dataprobe, Inc.		GFE
4.	1 ea.	DB-422-8	RS-422 Expander	Dataprobe, Inc.		GFE
5.	1 ea.	DB-RPS110A-R1	5 V Power Supply	Dataprobe, Inc.		GFE
6.	1 ea.	CS-138A	KVM Switch	Aten		GFE
7.	1 ea.		Kbd/Vid/Mse tray, rack mount	Dell		GFE

10.4 Tools Required

Use Integration Shop Crimp Tool M22520/5-01 (HX4) with die CD5-8 (or equivalent tool and die combination) for fabricating the twinax plenum cables.
Use Integration Shop Crimp Tool M22520/1-01 with die M22520/2-01 (or equivalent tool and die combination) for the Sub-D connectors.

10.5 Capital Equipment

N/A